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Country and Consumer Segmentation: Multi-Level Latent Class Analysis of Financial Product Ownership

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ABSTRACT

The financial services sector has internationalized over the last few decades. Important differences and similarities in financial behavior can be anticipated between both consumers within a particular country and those living in different countries. For companies in this market, the appropriate choice between strategic options and the resulting international performance may critically depend on the cross-national demand structure for the various financial products. Insight into country segments and international consumer segments based on domain-specific behavioral variables will therefore be of key strategic importance. We present a multi-level latent class framework for obtaining simultaneously such country and consumer segments. In an empirical study we apply this methodology to data on ownership of eight financial products. Information is available for fifteen European countries, with a sample size of about 1000 consumers per country. We find that both country segments and consumer segments are highly interpretable. Furthermore, consumer segmentation is related to demographic variables such as age and income. Our conclusions feature implications, both academic and managerial, and directions for future research.

JEL codes: C2, D1, F00, G1, M31

Key words: International market segmentation, Household portfolios of financial products, Latent class analysis, Multi-level analysis

INTRODUCTION

The market for financial products has become more international - even global - in the past few decades. Contemporary financial institutions often sell their products to consumers outside their national market (Chryssochoidis and Wong, 2000) or are involved in international mergers, acquisitions, or alliances (Berger, Dai, Ongena, and Smith, 2003; Focarelli and Pozzolo, 2001; Glaister and Thwaites, 1994; Marois, 1997). However, positioning one's products and targeting consumers across multiple nations raises new challenges and requires specific competences (see, for example, Kotabe and Helsen 2001, Chapter 7, and Jain, 1993, Chapter 11). When formulating an international marketing strategy, a firm must have a thorough understanding of the demand side in the various foreign markets and the ability to act upon these insights.

Household ownership of financial products is a fundamental element of this market. It has been shown that household ownership represents highly relevant information for corporate decision-makers to support decisions regarding product development and introduction, cross-selling, and segmentation (Dickenson and Kirzner, 1986; Kamakura, Ramaswami, and Srivastava, 1991; Kamakura and Wedel, 2003; Kamakura, Wedel, De Rosa, and Mazzon, 2003; Paas, 1998 and 2001; Ramaswami, Srivastava, and McInish, 1992; Ramaswamy, Chatterjee, and Chen, 1996; Soutar and Cornish-Ward, 1997). The portfolio of financial products owned by a household has consequently received considerable attention in both the marketing and economic literature (for a recent overview of the economic literature, see Guiso, Haliassos, and Jappelli, 2002). Additionally, marketing research on financial markets, including on household ownership patterns, has increased considerably throughout Europe (Bartram, 1998). In internationalized markets specifically, insights in cross-national similarities and differences in ownership patterns of financial and other products may reveal fruitful directions for international marketing strategy formulation (Ganesh, 1998; Helsen, Jedidi, and DeSarbo, 1993; Kumar, Ganesh, and Echambadi, 1998; Paas, 2001).

Segmentation will play an essential role in the formulation of an international marketing strategy based on the insights on the demand side of the market, because of cross-border dissimilarities and similarities in consumer needs, preferences, and behavior. Acting upon these dissimilarities and similarities calls for the grouping and subsequent targeting of countries and consumers within these countries. Furthermore, assessment and implementation of international segmentation requires specific procedures and methodologies that take account of the international setting of the issue under study. For many years, however, the issue of international market segmentation, has been largely ignored in the academic literature (Douglas and Craig, 1992), although interest has increased since the beginning of the ’90s (Steenkamp and Ter Hofstede, 2002).

Structuring the heterogeneity of international markets may refer to the act of grouping countries or consumers into segments. Companies use country segmentation to select entire foreign markets, and consumer segmentation to target specific groups of consumers within and across countries. Studies on international segmentation typically assess either country segments or consumer segments (for an overview, see Steenkamp and Ter Hofstede, 2002). Recently, Kotabe and Helsen (2001) and Steenkamp and Ter Hofstede (2002) proposed a two-stage framework to combine such country and consumer segmentations, which should result in a more comprehensive understanding of the demand structure of international markets.

The contribution of this paper is twofold. First, we propose a methodological framework for international segmentation in which we build on the notion of combining the segmentation of countries and consumers by Kotabe and Helsen (2001) and Steenkamp and Ter Hofstede (2002). The methodology underlying the model is based on multi-level latent class analysis, as recently proposed by Vermunt (2003). New in our approach is the framework for *simultaneously* deriving country segments and cross-national consumer segments on the basis of disaggregate data on consumer behavior. In particular, country segmentation will be determined on the basis of the relative sizes of the cross-national consumer segments. The simultaneous approach has the advantage that both country-

specific and cross-national consumer segments can be accommodated. Furthermore, the resulting country segments will be highly relevant for international marketing management, thanks to the direct connection between the country and consumer segmentations.

Next to the methodological objective, we aim at a substantive contribution, namely enhancing the understanding of ownership patterns of financial products. Most previous research concentrated on such patterns in a single country (e.g. Dickenson and Kirzner, 1986; Kamakura et al., 1991). To the best of our knowledge, Paas (2001) is the only international study on differences between consumers living in different countries. However, Paas (2001) did not study differences between consumers in the same country, which are expected to be substantial in most cases. Here, we will assess the similarities and differences across a large set of European countries. In particular, we study the extent to which there are cross-national versus country-specific consumer segments defined by ownership patterns and whether groups of countries exist that are homogenous in their consumer segment structure.

To realize these two contributions, we first discuss the concept of international segmentation and the framework of simultaneous country and consumer segmentation. We present the methodological framework of multi-level latent class modeling to perform the segmentation analysis. Next, we discuss the market of financial products. In an empirical study, we apply the methodology proposed to obtain country and consumer segments within the market of financial products. The segmentation is based on information regarding the ownership of eight financial products. Data is available for fifteen EU countries, with a sample size of about 1000 consumers per country. We conclude with both academic and managerial implications, and directions for future research.

INTERNATIONAL SEGMENTATION

International segmentation aims to structure the heterogeneity that exists among countries and consumers by identifying relatively homogenous segments of countries and/or consumers. The

structure that is revealed through such segmentations helps companies to develop and implement international marketing strategies.

International studies have traditionally focused on the country as the basic unit of analysis (Douglas and Craig, 1992; Steenkamp and Ter Hofstede, 2002). International segmentation thus typically consists of a preliminary screening of countries to identify which are potentially the most interesting (Kotabe and Helsen, 2001, p. 220). Through a strategic analysis of opportunities and risks within this primary set of countries, management decides upon its country portfolio (Harrell and Kiefer, 1993; Perlitz, 1985). Next, international segmentation is used for grouping the selected countries (Helsen, et al., 1993). Such country selections and classifications are usually based on aggregate data (at a national level) reflecting demographic, socio-economic, political, and cultural factors (Jain, 1993, p. 425-437; Nachum, 1994), instead of consumer-level and domain-specific variables. Variables specific for a certain domain, e.g. product ownership or benefits, however, are often more effective segmentation bases than general variables (Van Raaij and Verhallen, 1994; Wedel and Kamakura, 2000). Recently, penetration rates of products and international diffusion patterns have been suggested as a means for comparing, selecting and segmenting countries (e.g. DeKimpe, Parker, and Sarvary, 2000; Ganesh, 1998; Helsen, et al., 1993; Kumar, et al., 1998). However, in research exploring international segmentation, little attention has been directed towards within-country differences and to the behavioral variables measured at the consumer level.

Only a few studies have addressed the international segmentation issue by deriving cross-national segments of consumers (e.g. Luqmani, Yavas, and Quraeshi, 1994; Ter Hofstede, Steenkamp and Wedel, 1999), which could be due to the relative high cost and low availability of international databases at the consumer level. The research process to arrive at such international consumer segmentations is partly analogous to segmentation within a single country. To a large extent, the same consumer variables could be applied as segmentation bases, and the same criteria for effective segmentation hold (see, for example, Chapters 1 and 2 of Wedel and Kamakura, 2000). However, the

international nature of the problem at hand introduces additional conceptual and methodological challenges (for a recent overview, see Steenkamp and Ter Hofstede, 2002).

A particularly promising approach - namely a two-stage approach to international segmentation - has been proposed by Kotabe and Helsen (2001, p. 225) and Steenkamp and Ter Hofstede (2002). Countries are screened, selected and grouped, in the first step (similarly to international country segmentation as previously discussed). In the second step consumer segments are derived with either a cross-national analysis or a country-by-country analysis. In case of the latter, consumer segmentation per country, similarities between country-specific segments could be assessed across the countries.

Here, we build on the work by Kotabe and Helsen (2001) and Steenkamp and Ter Hofstede (2002) and propose the study of country segmentation and consumer segmentation in a single step, instead of sequentially. Segmentation at both levels is thereby based on disaggregate, domain-specific behavioral variables, such as product usage or ownership. Consumers are grouped on the basis of individual behavioral characteristics. Parallel to consumer segmentation, the formation of country segments is based on the relative size of the consumer segments. Two countries will belong to same country segment if they are highly similar in the within-country structure of consumer segmentation. This direct connection between the country and consumer segmentations, ensures the resulting country segments to be highly relevant and actionable for international marketing management. Furthermore, as will be illustrated in the empirical study, a particular consumer segment obtained with our approach can be cross-national, because it can be present in multiple country segments or in a single country segment containing multiple countries. However, a consumer segment can potentially be country-specific also, namely if it is present only in a single country segment which consists of just one country. Hence, the procedure proposed here is flexible in the characteristics of the segmentation and yields complete information on the segment structure of the international market.

MULTI-LEVEL LATENT CLASS ANALYSIS

Model Formulation

Latent class analysis or mixture modeling has been suggested as a model-based tool for regular market segmentation (Wedel and Kamakura, 2000) and international segmentation (Steenkamp and Ter Hofstede, 2002). Here, we present the method of multi-level latent class analysis to attain simultaneously country segmentation and cross-national consumer segmentation.

Suppose data is available on an international sample of consumers, denoted $i = 1,.., I$, originating from a set of countries, denoted $j = 1,..., J$. For each individual i, it is recorded whether this person owns each product from a set of products, denoted $k = 1,..., K$, where $Y_{ijk} = 1$, if consumer i from country j owns product k, and $Y_{ijk} = 0$ otherwise. The ownership data of an individual i is collected in vector Y_{ij}, and Y_j denotes the observed ownership data of all consumers of country j. The international sample of consumers is assumed to represent a limited number of *consumer segments*, denoted $s = 1 ,\ldots, S$. Furthermore, the countries under study are assumed to belong to a limited number of *country segments*, denoted $t = 1 ,\ldots, T$. Discrete latent variables X_{ij} and Z_j represent the consumer segment and country segment membership, respectively.

A multi-level latent class model (Vermunt, 2003) consists of a mixture model equation for the consumer level and one for the country level. For the consumer level, we specify the probability of product ownership for a consumer i from country j, conditional on membership of country j to country segment t, as follows:

$$(1) \qquad P(Y_{ij} \mid Z_j = t) = \sum_{s=1}^{S} P\left(X_{ij} = s \mid Z_j = t\right) \prod_{k=1}^{K} P\left(Y_{ijk} \mid X_{ij} = s\right).$$

Basically, equation (1) is a regular mixture model, with the novelty that the relative sizes of the latent classes (consumer segments) depend on the country segment. At the country-level, a similar mixture model equation is specified, namely:

$$(2) \qquad P(Y_j) = \sum_{t=1}^{T} P(Z_j = t) \prod_{i=1}^{N_j} P(Y_{ij} | Z_j = t),$$

where N_j denotes the sample size in country *j*. Combining equations (1) and (2) yields:

$$(3) \qquad P(Y_j) = \sum_{t=1}^{T} \left[P(Z_j = t) \prod_{i=1}^{N_j} \left[\sum_{s=1}^{S} P(X_{ij} = s | Z_j = t) \prod_{k=1}^{K} P(Y_{ijk} | X_{ij} = s) \right] \right] .$$

The right-hand side of equation (3) consists of three components, respectively: a) the probability that country *j* belongs to a particular country segment, b) the probability that consumer *j* belongs to a particular consumer segment, given the country segment membership, and c) the probability of a consumer owning a particular product *k*, given the consumer segment membership. Hence, the probability of observing the ownership data is a weighted average probability, where the weights are the country segment and consumer segment probabilities.

Component c) of equation (3) captures the key differences between consumer segments, namely the conditional probability that a consumer owns a particular product *k*. This is modeled in the form of a logit equation:

$$(4) \qquad P(Y_{ijk} = 1 | X_{ij} = s) = \frac{\exp(\beta_{ks})}{1 + \exp(\beta_{ks})}.$$

Component b) of equation (3) captures the key differences between the country segments, namely the relative size of each of the consumer segments. This is also modeled through a logit equation:

$$(5) \qquad P(X_{ij} = s' | Z_j = t) = \frac{\exp(\gamma_{s't})}{\sum_{s=1}^{S} \exp(\gamma_{st})}.$$

Next to differences between countries in the relative size of consumer segments, we anticipate effects of consumer characteristics, e.g. demographic variables, on consumer segment membership.

Such effects can be included by means of one or more concomitant variables, denoted by W_{ij}, in the latent class model (Dayton and MacReady, 1988; Gupta and Chintagunta, 1994; Wedel, 2002):

$$(6) \qquad P\left(X_{ij} = s' \middle| W_{ij}, Z_j = t\right) = \frac{\exp\left(\gamma_{0s't} + \gamma_{1s'} W_{ij}\right)}{\sum_{s=1}^{S} \exp\left(\gamma_{0st} + \gamma_{1s} W_{ij}\right)}.$$

Model Estimation

The parameters of the multi-level latent class model can be estimated by Maximum Likelihood. Maximization of the likelihood function can be achieved by an adapted version of the EM algorithm. For details on model estimation, see Vermunt (2003).

International research using consumer-level data is typically based on national samples that are not proportional to actual population sizes. If conclusions are required regarding the entire international population, reweighting would be necessary in order to make the pooled sample representative (Steenkamp and Ter Hofstede, 2002). To achieve valid inferences in the multi-level latent class analysis, we weight each observation by sample size relative to population size per country. To account for discrepancies between sample size and population size across countries, we obtain model estimations by means of the pseudo maximum likelihood method (Patterson, Dayton, and Graubard, 2002; Wedel, Ter Hofstede, and Steenkamp, 1998),

Model estimates are obtained for fixed numbers of country segments (*T*) and consumer segments (*S*). Appropriate values for these numbers can be determined by estimating the multi-level latent class model for different values of *T* and *S*, and examining the relative fit of the alternative model specifications, e.g. by using the minimum CAIC rule (Vermunt, 2003; Wedel and Kamakura, 2000).

EMPIRICAL STUDY: THE MARKET FOR FINANCIAL PRODUCTS

Internationalization of the Market for Financial Products

The financial service sector has become internationalized over the last few decades. Most contemporary banks, insurance companies, and other financial service providers nowadays operate in multiple countries. The internationalization of the market for financial products has been stimulated by deregulation of the sector and improvements of information technology. Additionally, the foundation of a single market within the European Union and the introduction of the Euro have accelerated the internationalization process within Europe. Nevertheless, internationalization of the financial services industry still lags behind many other industries and is often not quite successful (Berger, et al., 2003).

Managers in this internationalized market face strategic issues, such as whether or not the same strategy can be used in several countries. Firms offering financial products turn out to differ considerably in their strategies for survival in an increasingly international environment (Marois, 1997). The strategic options are direct selling of their products (Chryssochoidis and Wong, 2000) or cross-national mergers, acquisitions, or alliances (Berger et al., 2003; Focarelli and Pozolo, 2001; Glaister and Thwaites, 1994). Most academic and management attention has been directed to the supply side of the market. The little attention towards the consumer side has usually been directed to the general market structure, whereas insight into micro-level aspects, such as the behavior of individual consumers, would also be highly relevant.

Important differences and similarities in financial behavior could be anticipated both between consumers within a particular country as well as between consumers living in different countries (Guiso, et al., 2002; Paas, 2001). For example, consumers in countries with less developed economic systems typically have different financial needs than consumers in more industrialized countries, and within Europe substantial differences can indeed be observed (Bartram, 1998). Such differences lead to different consumer segments being present in various countries. Now, the appropriate choice between

strategic options and the (lack of) international success may critically depend on the cross-national demand structure for the various financial products. In particular, the success in an international market depends strongly on the appropriateness of the international segmentation, just as the success in a national market depends on an effective segmentation (Wedel and Kamakura, 2000). Therefore, insight into country and international consumer segments based on domain-specific behavioral variables will be of key strategic importance in the financial products market.

Database on Product Ownership

We apply the model proposed in this paper to a recently collected data set: Eurobarometer 56.0 (Christensen, 2001). The data were collected between August 22nd and September 27th 2001 by a consortium of market research agencies at the request of the European Commission, Directorate-General Press and Communication, Opinion Polls. The Eurobarometer survey covers the population (aged 15 years and over) of the EU member states. There are 17 sampling areas: Germany is divided into East and West, United Kingdom into Great Britain and Northern Ireland, and one sampling area is designated for each of the other countries. Below the terminology "country" will refer to a sampling area. Sample sizes were targeted to be 1000 per country, with the exception of Luxembourg (600) and Northern Ireland (300). The total sample size is 16,200. A weighting variable was computed to make each national sample representative with respect to basic demographic variables and additionally to correct for cross-national differences in sample versus population size (see Table 1). All interviews were conducted face-to-face in the respondent's home and in the appropriate national language.

[Insert Table 1 about here]

Information is available on ownership of eight financial products: current account, savings account, credit card, other bank card, cheque book, overdraft facility on current account, mortgage, and

other loan. This set of products corresponds to the set of core products in previous studies such as Kamakura, et al. (1991). Preliminary inspection of penetration rates of the products shows large differences across the countries, but also some striking similarities (Table 1). In addition, the following four demographic variables that might be relevant for the topic at hand are available: age (15 to 29, 30 to 59, 60 and older), marital status (living with partner, single), income (below median, above median, not available), and type of community (rural area or village, small city to large city).

RESULTS

Country and Consumer Segments

To study the ownership pattern for the eight financial products and to examine the similarities and differences therein across 16,200 respondents and 17 countries, we apply the multi-level latent class analysis as described previously. While obtaining parameter estimates, we weighted the observations to correct for sampling discrepancies both within and between countries, as recommended by Steenkamp and Ter Hofstede (2002). Model estimates are obtained for alternative values of the number of consumer segments (S = 1,…, 15) and country segments (T = 1 ,…, 8). To account for sub-optimal solutions, we estimated the model ten times for each combination of S and T with different random starting values, and retained the best solution for each combination.

[Insert Table 2 about here]

Table 2 reports model fit (in particular, the CAIC value) for each combination of S and T. The optimal number of consumer segments is relatively low when the number of country segments is low also, but increases rapidly when the number of country segments increases from one to three. With three to eight country segments, a minimum CAIC is reached with fourteen consumer segments. From

the opposite perspective: when the number of consumer segments is larger than two, the optimal number of country segments varies between six and eight. The overall minimum CAIC is attained at fourteen consumer segments and seven country segments, which we identify as the most appropriate solution. These results are presented in Tables 3 and 4.

[Insert Tables 3 and 4 about here]

First, note that posterior classification of countries to segments can be done almost in a deterministic fashion: almost all membership probabilities are virtually indistinguishable from 0 or 1 (Table 3). The only exception is Luxembourg, which has a fairly high membership probability for two country segments. The classification of countries into segments is strongly related to the European geography, with several noteworthy peculiarities. The country segments have been ordered in size to support interpretation. The largest segment contains the Scandinavian countries, Austria, and Luxembourg (for just over 50 %). The second segment is nearly as large and contains the low countries (Belgium and The Netherlands), Germany, and Luxembourg (for 47 %). Great Britain, Northern Ireland, and Ireland are combined to form segment 3. Contrary to the other parts of Europe, Southern Europe consists of many small segments: Italy and Portugal together form country segment 4, and Spain, Greece, and France remain three single-country segments. Apparently, ownership patterns of financial products are relatively diverse across the countries in Southern Europe.

Product ownership within each of the fourteen international consumer segments is presented in the upper part of Table 4. To aid interpretation, we ordered the consumer segments in ascending order of the penetration rates aggregated across the eight financial products. The most pronounced feature of the first three segments is the very low penetration of the basic payment product (current account) and more advanced payment products (credit card or other banking card). Segment 1 actually has low probabilities for all products, whereas segment 2 has a fairly high rate for the savings account only and

segment 3 for the savings account and the cheque book only. Overall, however, consumers of the first three segments own only a very small number of financial products. Consumer segments 4 to 9 have penetration rates close to one for the current account and some other payment-facilitating products. On average, the penetration rates of these other payment-facilitating products gradually increase from segments 4 to 9. Furthermore, which payment-related product is owned is the key factor differentiating between these segments. For example, the ownership probabilities are similar for segments 7 and 9 with the exception of other bank card (much higher in segment 7) and cheque book (much higher in segment 9). Also, credit card ownership is very high in segment 6, and cheque book ownership in segment 8. Contrary to all other consumer segments, segments 10 to 14 have relatively high ownership probabilities for the financial credit products (overdraft, mortgage, and other loans). Segments 10 and 12 are similar, with the exception of other bank card (much higher in segment 10) and cheque book (much higher in segment 12). Segment 11 has high rates for almost all products, but has the lowest rate across all segments for savings account. Segments 13 and 14 contain the heavy users: penetration rates for all eight financial products are relatively high; most notably the rate pertaining to the overdraft facility in segment 13 and mortgage in segment 14.

Model results linking the country and consumer segments are presented in the lower part of Table 4. At first glance, fourteen consumer segments might seem to be a large number of segments. However, many of these segments are present in only one or very few country segments. If we use 0.10 as a threshold for the relative size of a consumer segment within a country segment, consumer segments 1, 2 and 4 appear in multiple-country segments, whereas consumer segments 5 to 14 are sizeable in only one country segment. Hence, most consumer segments with small overall penetration rates are truly cross-national (or even pan-European) segments, whereas consumer segments with higher ownership rates are specific to a particular country segment.

Most country segments contain three relatively large consumer segments: one with low penetration rates (consumer segments 1 to 3), one with medium to high rates for the payment products

but low rates for the credit products (consumer segments 4 to 9), and one with high rates for most products (segments 10 to 14). For instance, country segment 1 (Austria, Scandinavian countries, and Luxembourg) primarily contains consumer segments 2, 4, and 10, which share the feature of very low penetration rates for the cheque book. Country segment 2 (Belgium, Germany, Netherlands, Luxembourg) consists largely of consumer segments 4, 7, and 13, which all have very high penetration rates for the current account, savings account, and other bank card. The consumer segments that shape country segment 3 (Ireland, Northern Ireland, Great Britain) are very diverse: ranging from extremely low rates on all products (consumer segment 1) to extremely high rates for all products (consumer segment 14). Country segment 4 (Italy and Portugal) largely consists of consumer segments with very low rates for the savings account (consumer segments 1, 5, and 11). In Spain (single-country segment 5) many consumer segments are medium-sized to large. The larger segments in this country are consumer segments 1, 2, and 6, which share low penetration rates of cheque book, overdraft facility, mortgage and loan. Consumers with high ownership rates are scattered here across segments 10, 11, 12 and 14. Consumer segment 2, with low penetration rates in all but the savings account, is extremely dominant in Greece. Similarly, France (single-country segment 7) mainly consists of only two consumer segments, namely 8 and 12. Both consumer segments have very high ownership rates for cheque book, while consumers in segment 12 all have a credit card, whereas consumers in segment 8 typically have another bank card.

Effects of Demographic Variables

Ownership of financial products, and thereby membership to the consumer segments, is often related to demographic variables such as age and income (Guiso, et al., 2002; Javalgi and Dion, 1999; Ramaswamy, et al., 1996; Tin, 2000). The multi-level latent class analysis allows incorporation of such individual differences by means of concomitant variables, as shown in equation (6). Hence, the probability that a consumer belongs to a particular segment is modeled to depend on his/her

demographics as well as the country segment of this consumer. This relationship between the consumer-segment classification and demographics supports interpretation of the segments and subsequently increases the targeting possibilities of a company.

This empirical study assesses the effects of four demographic variables: age, marital status, income, and type of community. To ensure that the consumer segments to be explained do not alter, we fix the parameter values for the measurement model relating financial products to consumer segments (upper part of Table 4). However, we re-estimate the country segmentation and the relation between the country segments and consumer segments, next to the newly introduced demographic effects.

We estimate a full model including all four concomitant variables, and four sub-models each omitting one of the variables. To assess the significance of the demographic effects, we employ the well-known chi-square test for nested models. All four demographic variables turn out to have a highly significant influence of consumer segment membership: age (χ^2 = 1267.49; d.f. = 50; $p < .001$), income (χ^2 = 978.94; d.f. = 50; $p < .001$), marital status (χ^2 = 419.88; d.f. = 31; $p < .001$), and type of community (χ^2 = 67.46; d.f. = 31; $p < .001$).

The findings regarding the country-segment sizes, the classification of the countries to these segments, and the relationship with the consumer segment are virtually identical between the model including concomitant variables and the previous model without such effects (Tables 3 and 4). Therefore, we focus here on the effects of the demographic variables as presented in Table 5. To facilitate interpretation we do not present the original logit parameters, but instead the segment membership probability per category of each demographic variable, averaged across all categories of the other variables.

[Insert Table 5 about here]

Age has a huge influence on the consumer segment probabilities. The low penetration segments 1 and 2 are overrepresented in the age groups 15 to 29 and 60 and older, whereas the high penetration segments 10 to 14 are highly overrepresented in the intermediate age group (30 to 59 years). The segments with generally moderate penetration rates are mixed in that sense: some are overrepresented in the younger group (segment 4), whereas other segments are strongly present in the middle group (segment 6) or in the older group (segments 7, 8, and 9). The effect of income resembles that of age, where the high-income group corresponds to the age group of 30 to 59 years. An exception to this comparison is segment 6, which is relatively large in age group 30 to 59 years, but relatively small in the high-income group. This segment originates mainly from the single-country segment of Spain, and stands for relative high penetration rates within that country segment. Consumers living together with a partner have a relatively high probability to be member of segments 10, 13, or 14, which all have high penetration rates for many financial products. These three segments form the top three with respect to penetration of the mortgage, and mainly originate from the Northern and Western parts of Europe (country segments 1 to 3). Of the demographics included in this study, the type of community has the smallest impact, as shown by the chi-square tests and the differences between the segment probabilities. Consumers living in a rural area or a village are overrepresented in segments 2, 3 and 14, whereas consumers living in a city are overrepresented in segment 6. The other consumer segments have similar probabilities for both types of communities. Finally, membership probability for segment 5 is not strongly affected by any of the demographic variables.

Segmentation Effectiveness

The following criteria have been put forward as determinants of the effectiveness of market segmentation (Wedel and Kamakura, 2000, p. 4; Kotabe and Helsen, 2001, p. 219; Steenkamp and Ter Hofstede, 2002): substantiality, stability, identifiability, accessibility, responsiveness, and actionability. Although the number of consumer segments may appear relatively large, the fact that many consumer

segments are cross-national or else represent a large fraction of a single country ensures that all segments are large in size (substantiality). Furthermore, the fact that financial product ownership does not change frequently at the consumer level ensures that the segments do not change dramatically over time (stability). However, the segmentation will not be excessively fixated, and trends could be monitored regarding demographics and ownership rates of certain financial products. Furthermore, the country segmentation should be monitored over time, among other reasons because of potential convergence within the EU. Recognizing the distinct groups (identifiability) will be relatively easy to accomplish in the proposed segmentation of the market for financial products. Although ownership of financial products is registered automatically by the companies that sell the products, from the perspective of a single company some information will be missing, which poses an additional challenge (Kamakura and Wedel, 2003; Kamakura et al., 2003). Furthermore, the relation with demographic variables further facilitates identification of the segments. This relationship also enhances the extent to which a company can reach particular targeted segments (accessibility). Whether or not the segmentation proposed will perform well on responsiveness and actionability is a priori somewhat unclear. Fortunately, relationships between product ownership and marketing mix instruments have been demonstrated, for example to suggest cross-selling opportunities (Kamakura et al., 1991 and 2003). The substantial differences between and within countries in product ownership, as observed in this study, clearly suggest actions regarding cross-selling, product introductions, and targeting of particular country and/or consumer segments. Hence, considering the criteria for effective segmentation, the solution obtained here qualifies as excellent.

CONCLUSION

International market segmentation is an essential tool to enlarge understanding of international markets and thereby supports companies to formulate strategies to deal effectively with demand heterogeneity across borders. However, to fulfill this promise a number of issues have to be dealt with. Steenkamp

and Ter Hofstede (2002, Figure 2) mentioned: 1) combining country segmentation and cross-national consumer segmentation, 2) model-based segmentation, 3) correction for response styles, and 4) sample reweighting.

In this paper, we present a framework using multi-level latent class analysis, which simultaneously derives country segments and consumer segments. The model-implied direct connection between the country and consumer segmentations, ensures the resulting segments at both levels to be highly relevant and actionable for international marketing management. In addition, the consumer segmentation is flexible in the sense that the segments obtained can be cross-national or country-specific. Moreover, the procedure proposed meets the guidelines for effective international market segmentation as mentioned previously. The two levels are modeled as interdependent: countries are grouped on basis of the similarity between their within-country structure of the consumer segments. The segments at both levels are obtained using consumer-level data on ownership of financial products. Given the type of data, objective measures rather than attitude ratings, biases due to response styles are avoided. Furthermore, marketing and economic theory on ownership of financial products and statistical model formulation allow a model-based approach. Finally, by using pseudo maximum likelihood, which reweights the observations to correct for relative sample size differences between countries, we construct an internationally representative sample and obtain generalizable findings. Hence, the procedure presented promises to be a fruitful direction for international market segmentation.

Besides the methodological contribution, the empirical study of ownership patterns of financial products yields a number of interesting substantive insights. The demand structure is highly similar within certain small groups of European countries, whereas it is considerably different between these groups. This country grouping is strongly related to the European geographical map. For example, Belgium, Germany, Luxembourg, and the Netherlands constitute a group of countries that is fairly homogenous in the ownership patterns observed within these countries. The Mediterranean countries,

on the other hand, are much more heterogeneous. For example, Greece includes a huge consumer segment that basically only has a savings account, whereas France includes several segments that have exceptionally high penetration rates for the cheque book. Although, convergence could be anticipated within the EU (Berger, et al., 2003; Ganesh, 1998) because of the Euro and regulatory standardization, for the moment Europe consists of a partly heterogeneous group of countries considering the ownership of financial products.

The consumer segmentation is strongly related to demographic variables such as age, income, and marital status. Segments with high penetration rates for many financial products are typically overrepresented in the intermediate age group, high income group, and in the group of consumers living with a partner. This finding is consistent with previous research on the family life-cycle effects within this category (Javalgi and Dion, 1999; Soutar and Cornish-Ward, 1997; Tin, 2002) and to the life-cycle theory (Browning and Lusardi, 1996). The latter suggests that households with a middle-aged head and consisting of more than one person are most likely to be financially active. Potentially these findings could also support the idea of preset acquisition patterns (Dickenson and Kirzner, 1986; Paas, 1998, 2001; Soutar and Cornish-Ward, 1997), which determine the order by which the financial products are purchased. Given the nature of the product category, such an ordering should be reflected in the ownership segments. However, ordering the financial products in ascending penetration rates does not yield an ordered structure for the consumer segments. This holds across country segments as well as within a country segment. For example, consumer segments 8 and 12 are similar and both fairly large in France, but whereas in segment 8 penetration of the credit card is very low and penetration of the bank card very high, the opposite holds within segment 12.

Our findings are highly relevant in the contemporary international markets, as studying financial markets is a growing practice and now takes a prominent place in marketing research worldwide (Bartram, 1998). Important managerial insights can be obtained on behavior of consumers within such markets. In particular, our empirical study reveals a clear international segmentation

structure. All country and consumer segments have high face validity and are easy to label. Furthermore, the relation with the demographic variables supports targeting of the cross-national segments. Specifically, to prevent international failures in the market, it is essential not to treat Europe (yet) as a single market. Major differences exist between some countries, which need to be accounted for when formulating the marketing strategy. For example, introductions of rather complex financial products will not be wise in Greece, whereas it could be a good option to target certain consumer segments within a certain country segment. Three consumer segments typically exist within each country segment. For some country segments, these three consumer segments can often be ordered on overall penetration rates and there seems to be a strong relationship with the stages in the family life-cycle. For example, in country segment 2 (Benelux and Germany), consumer segments 4, 7 and 13 are ordered in increasing overall penetration rate and reflect the family life-cycle in the segment order of 4, 13, and 7. Such a sequential structure within a country segment clearly suggests opportunities for customer-relationship management, product introductions, and cross-selling.

To the methodological and substantive contributions, we like add a final point regarding the general applicability of the multi-level latent class model (Vermunt, 2003). The method proved here to be an effective tool for international market segmentation, but could be applied in other marketing settings also. Key is the nested classification structure that is not directly observed but has to be inferred from the data. A multi-level classification might be sought, for example, for customers nested within outlets of a retail chain. A similar structure can be found for business-to-business customers of multiple offices of a particular financial service provider. In both cases, the model would yield segments of customers and simultaneously a grouping of the store outlets or offices. Hence, the multi-level latent class procedure presented in this paper warrants further application in international segmentation studies and in studies that search for comparable nested classification structures.

Table 1. Descriptive Statistics for the International Sample

Country	Sample Size	Average Weight	Ownership of Financial Product (Sample Proportion)							
			Current Account	Savings Account	Credit Card	Other Bank Card	Cheque Book	Overdraft Facility	Mortgage	Loan
Austria	1093	.34	71.5	82.3	33.7	61.0	21.6	41.4	17.7	21.8
Belgium	1031	.43	85.2	85.9	39.2	74.0	34.2	33.3	25.9	21.1
Denmark	1001	.22	78.5	63.2	48.2	60.8	33.9	55.2	51.8	36.3
Finland	1023	.21	87.5	50.2	31.5	84.7	0.7	16.0	22.0	26.5
France	1002	2.42	87.8	69.8	57.7	31.0	87.9	50.6	18.6	26.6
Germany East	1024	.67	91.8	76.1	22.5	81.2	41.5	35.7	13.0	23.0
Germany West	1023	2.87	89.5	84.2	29.9	78.0	40.9	39.8	16.8	16.5
Great Britain	1041	2.37	75.2	77.1	52.3	58.7	76.4	29.3	37.1	20.1
Greece	1001	.45	11.0	79.7	18.7	25.9	6.3	3.4	14.6	11.6
Ireland	1002	.15	51.4	71.7	32.3	40.3	45.1	16.2	25.7	26.6
Italy	998	2.52	65.6	19.4	36.3	51.3	62.7	10.0	12.3	12.8
Luxembourg	609	.03	84.7	81.8	65.0	69.6	49.6	50.9	29.7	30.0
Netherlands	1047	.65	89.5	82.5	37.2	94.3	26.6	63.6	33.6	14.9
Northern Ireland	305	.22	62.3	59.7	42.3	41.3	62.3	21.3	35.7	14.1
Portugal	1000	.42	70.0	44.2	33.0	33.0	60.8	2.5	13.0	8.0
Spain	1000	1.70	61.6	67.2	52.1	33.2	17.4	8.2	19.4	17.2
Sweden	1000	.37	76.1	77.5	57.0	59.4	19.7	19.0	34.7	25.8

Table 2. Model Fit (CAIC) for Alternative Numbers of Country and Consumer Segments*

Number of Consumer Segments	Number of Country Segments							
	1	2	3	4	5	6	7	8
1	*157050*	157060	157071	157082	157093	157103	157114	157125
2	143258	141981	141633	141651	*141467*	141487	141507	141529
3	141181	137122	136389	135659	135602	135311	*135294*	135308
4	140550	135302	133064	132234	132138	*131971*	131997	131812
5	140319	134870	132229	130096	129988	129929	129911	*129678*
6	139884	134464	131393	129254	128381	128172	*128167*	128206
7	139764	134175	130895	129198	127718	127620	127610	*127501*
8	139638	133621	130692	128631	127079	127138	126944	*126801*
9	**139634**	133441	130265	128411	126645	126445	126524	*126231*
10	139678	133149	130034	127903	126177	126059	*125859*	125870
11	139716	**133152**	129901	127340	126031	*125685*	125749	125707
12	139764	133179	129809	127336	125699	125660	*125657*	125734
13	139831	133263	129795	127282	125638	125532	*125349*	125427
14	139900	133236	**129685**	**127160**	**125600**	**125519**	**<u>125206</u>**	**125330**
15	139972	133268	129688	127182	125619	125586	*125361*	125462

*Lowest CAIC within each row is printed italic, and within each column in boldface; lowest CAIC overall is underlined.

Table 3. Model Results: Country Segments

Country Segment	Relative Size	Probabilities of Country-Segment Membership $\{P(Z_j = t \mid Y_j)\}$ *	
		Country	Probability
1	.260	Austria, Denmark, Finland, Sweden	1.000
		Luxembourg	.533
2	.256	Belgium, Germany (East), Germany (West), The Netherlands	1.000
		Luxembourg	.467
3	.175	Great Britain, Ireland, Northern Ireland	1.000
4	.119	Italy, Portugal	1.000
5	.064	Spain	1.000
6	.064	Greece	1.000
7	.064	France	1.000

* All unlisted posterior probabilities < 0.001

Table 4. Model Results: Consumer Segments

	Consumer Segments:													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Financial products:	Product Ownership Probabilities $\{P(Y_{ijk}=1 \mid X_{ij}=s)\}$													
Current Account	.058	.034	.195	.998	1.000	.991	.984	.997	.997	.880	1.000	1.000	.976	1.000
Savings Account	.362	.769	.660	.709	.124	.689	.918	.595	.850	.683	.064	.794	.879	.869
Credit Card	.000	.068	.000	.009	.350	.920	.349	.116	.569	.742	.869	1.000	.417	.866
Other Bank Card	.000	.164	.013	.778	.633	.316	.900	.654	.636	.785	.973	.113	.932	.892
Cheque Book	.137	.009	.819	.001	.785	.158	.531	.987	.945	.100	.984	.975	.494	1.000
Overdraft	.000	.040	.372	.138	.039	.048	.009	.495	.000	.412	.269	.603	.788	.663
Mortgage	.016	.085	.269	.060	.071	.232	.033	.111	.190	.462	.286	.211	.317	.722
Loan	.023	.074	.264	.106	.081	.188	.000	.183	.033	.464	.292	.307	.296	.428
Country segments:	Relative Sizes of Consumer Segments $\{P(X_{ij}=s \mid Z_j=t)\}$													
1	.015	.158	.033	.181	.004	.050	.012	.002	.024	.383	.000	.000	.073	.064
2	.031	.058	.012	.187	.000	.017	.211	.000	.000	.004	.000	.001	.450	.029
3	.136	.088	.056	.016	.006	.006	.000	.030	.274	.010	.006	.008	.000	.363
4	.340	.000	.027	.002	.356	.010	.000	.000	.035	.000	.220	.002	.000	.010
5	.108	.280	.004	.042	.006	.394	.000	.000	.035	.078	.015	.012	.000	.026
6	.004	.876	.001	.002	.000	.000	.000	.000	.040	.063	.000	.000	.000	.013
7	.060	.008	.081	.022	.026	.000	.007	.254	.001	.000	.000	.500	.006	.035

Table 5. Model Results: Effects of Demographic Variables

	Relative Sizes of Consumer Segments													
Consumer Segments:	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Age:														
15-29	.140	.247	.014	.112	.060	.066	.021	.030	.033	.074	.012	.072	.058	.061
30-59	.079	.184	.039	.047	.045	.083	.028	.039	.041	.101	.052	.082	.080	.100
60+	.125	.239	.053	.059	.067	.043	.070	.057	.114	.015	.015	.065	.055	.023
Income:														
Below Median	.140	.253	.043	.103	.050	.070	.035	.056	.060	.044	.010	.060	.060	.016
Above Median	.065	.189	.033	.040	.058	.049	.041	.030	.068	.101	.042	.092	.081	.111
Unknown	.135	.228	.030	.075	.065	.073	.043	.039	.059	.046	.028	.068	.053	.056
Marital Status:														
Living with Partner	.078	.211	.040	.061	.058	.065	.035	.046	.061	.082	.027	.079	.074	.084
Single	.152	.236	.031	.084	.057	.063	.044	.037	.064	.045	.027	.068	.055	.038
Type of Community:														
Rural Area or Village	.116	.237	.041	.074	.052	.056	.039	.045	.057	.062	.023	.069	.062	.068
Small to Large City	.114	.210	.029	.071	.063	.072	.040	.039	.068	.065	.030	.078	.067	.054

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